

ABSTRACT

An interface device and method providing haptic sensations to a user. A user physically
5 contacts a housing of the interface device, and a sensor device detects the manipulation of the
interface device by the user. An actuator assembly includes an actuator that provides output
forces to the user as haptic sensations. In one embodiment, the actuator outputs a rotary force,
and a flexure coupled to the actuator moves an inertial mass and/or a contact member. The
flexure can be a unitary member that includes flex joints allowing a portion of the flexure to be
10 linearly moved. The flexure can convert rotary force output by the actuator to linear motion,
where the linear motion causes a force that is transmitted to the user. In another embodiment, the
actuator outputs a force, and a mechanism coupling the actuator to the device housing uses the
force to move the actuator with respect to the device housing. The actuator acts as an inertial
mass when in motion to provide an inertial force that can be transmitted to the user. The
15 mechanism can be a flexure including at least one flex joint or a mechanism with bearings.